its results, and much disappointed at its failure. On subsequent examination no chickens were found in the eggs.

No. 2.—CHRISTY: Hydro-Incubator.

Eggs placed in incubator		50
Found fertile after testing	45	
Unfertile	5	
Broken during competition	0	
Hatched by 12 noon, September 26 ...	34	
Not hatched 11	11	
Percentage of eggs hatched		75·55

Three more chickens were hatched alive after the competition had closed. The other eggs, on being examined, were all found to have living chickens in them. The prize of 25*l.* was awarded to this incubator.

No. 3.—CHRISTY: Hydro-Incubator.

Eggs placed in incubator		50
Found fertile	45	
Unfertile	5	
Broken during competition	1	
Hatched by 12 noon, September 26 ...	20	
Not hatched	24	
Percentage of eggs hatched		44·44

Two chickens were hatched alive after the competition was ended. Of the remaining eggs ten were found to have living chickens in them.

No. 4.—BOYLE: Heated by lamp.

Eggs placed in incubator		48
Found fertile	40	
Unfertile	3	
Broken during competition	2	
Hatched by noon, September 26 ...	11	
Not hatched	27	
Percentage of eggs hatched		27·55

On examining the eggs, Saturday, September 28, four chickens were found ready to break the shell. This incubator worked with great regularity, and deserves much commendation.

No. 5.—BOYLE: Heated by gas.

Eggs placed in incubator		52
Found fertile after testing	42	
Unfertile	10	
Broken during competition	26	
Hatched by 12 o'clock noon, Sept. 26...	0	
Not hatched	16	
Percentage of eggs hatched		0

The egg rests in this machine are spiral wire springs The egg drawer did not fit well, and is certainly capable of improvement. Full and very clear instructions should always accompany this incubator. Its want of success must not be attributed altogether to the inexperience of the attendant.

No. 6.—PENMAN'S (worked by lamp): Exhibited by Messrs. E. T. Brown and Son, Newcastle-on-Tyne.

By this no eggs were hatched, but twenty dead chickens were found in the eggs on September 28, having been dead apparently several days. The lamp in this incubator worked very irregularly, needing constant attention by day and night.

No. 7.—PENMAN'S (worked by gas).

By this also no eggs were hatched, but on examining the eggs at 6 P.M. on Saturday evening, Sept. 28, thirty-four chickens were found to be alive in them, two having been hatched out on the same morning alive. The source of heat—viz., gas—had been turned off at 8 P.M. on the Friday night previous, and the drawer had been opened and shut constantly after the exhibition was opened at noon on Thursday. The irregularity of heat from the gas was doubtless the cause of failure in this instance, the pressure being very unequal.

The committee subjoin to this report a register of the temperature maintained in the drawer of each incubator, together with that of the water drawn off from the boilers in the case of the hydro-incubators. The chickens hatched are doing well, some under them, some in artificial mothers.

Such are the facts of this interesting trial, and they seem to us to prove not only that artificial incubation is possible, but that by Mr. Christy's machine, if not with some of the others, it might become a remunerative business, and add materially to the sources of our food supplies.

NOTES

BY the kindness of Gen. Myer, the distinguished head of the U.S. Army Signal Service, we are enabled this week to give the official description of the weather case, the distribution of which among the 27,000 rural post-offices in the United States has just commenced. It is for use in those parts of the country where the daily weather indications cannot reach in time to facilitate agricultural operations, and its issue has been forced upon the Government because the American farmers are wise enough to see that for them, as well as for sailors, to be forewarned is to be forearmed. In a few centuries we may expect to have something of the same kind here.

M. BOUILLAUD, the once celebrated medical practitioner, who is a member of the Paris Academy of Sciences, assailed M. du Moncel in the sitting of September 30, and asserted that the phonograph and microphone experiments must be the work of ventriloquists. This fit of incredulity was occasioned by the recital of experiments made with the singing conductors. M. du Moncel asked for a commission of investigation to be appointed, although such accusations are not deserving of any notice, and have, indeed, raised universal ridicule. But the regulations of the Academy forbid any commission to be appointed to pronounce on the works or communications of members. Another curious scene took place at the sitting of last Monday. M. du Moncel presented to his colleagues, the "condensateur chantant," which had been exhibited on the previous Saturday. He retired to the room of the Académie Française, in company with M. Faye, closed the door and sang. His voice was heard coming from a number of sheets of paper, in which six sheets of tinfoil had been inserted, and connected with the wires of an induction coil. M. Bouillaud was obliged to retreat from the position he had taken at the sitting of September 30. He made no allusion to the accusation of ventriloquism, but read a long quotation from Descartes, to show that "even if a speaking machine had been constructed, it could by no means be considered as a thinking machine." He said that speaking was not only a mechanical action, but also an intellectual work, so that neither the phonograph nor the singing condenser could be regarded by any means as really speaking! The whole assembly, in spite of its usual gravity, burst into roars of laughter. M. Milne-Edwards, who spoke at the previous sititng, said with much propriety, he should not have answered M. Bouillaud if he had understood such was his issue. Unfortunately he had understood, as everybody in the assembly did, that M. Bouillaud questioned the honesty of the experimenter. At the end of the sitting M. du Moncel performed all the principal experiments of the phonograph.

SOME remarkable experiments in Electric Telephony were shown by Prof. Barrett in a lecture at the Midland Institute a

few days ago. By means of Edison's carbon telephone, which promises to be the telephone of the future, the lecture was electrically transmitted to the Arts Club in an adjoining street, though the transmitting instrument was several feet from the speaker; conversely, an assistant, speaking near to the distant carbon transmitter, was heard in a dozen different receiving magneto-telephones distributed through the lecture Hall. Further, by employing a single "Phelps" telephone as receiver, and using a paper cone as the mouth-piece of the telephone, 300 or 400 people in the neighbourhood of the instrument were able to hear distinctly sentences and songs given to the distant carbon telephone. And finally, by the same means, the entire audience of some 1,500 people heard single words, such as Bravo! Halloa! &c., spoken to the far telephone. Other experiments, of a more crucial character, demonstrated that this new telephone of Edison's will probably place electric-telephony on an entirely new and more practical basis. Prof. Barrett also showed Mr. Edison's tasimeter, an adaptation of the principle of the carbon telephone, the instrument having been kindly sent over by Mr. Edison for this lecture. The extraordinary delicacy of the tasimeter to heat radiation was shown to the audience by the heat radiated from the face throwing the beam of light reflected from a galvanometer completely off a ten-foot scale. The megaphone and several other of Mr. Edison's recent inventions were also successfully shown in this lecture.

NEWS of Prof. Nordenskjöld's North-East Passage Expedition has reached Stockholm. It left the north coast of Norway on July 25, reached Jugor Straits on the 30th; steamed on August 1, and arrived at the mouth of the Yenissei on the 6th. It was intended to start afresh on August 10. The Kara Sea was nearly free of ice. A little scattered drift ice near White Island was the only ice met with during the whole voyage. The expedition has thus a good prospect of success.

THE *Times* correspondent writes from Naples, September 29, that for the past two or three days, according to Prof. Palmieri's report, the activity of the mountain had much diminished, and the seismic instruments had been quieter. At the time of the new moon there was an increase of activity, as is always the case, and it will be witnessed, no doubt, at the time of full moon; but the mountain pursues its regular course, except at these seasons, and some little time must elapse before what the world calls an eruption will occur. Of what character it will be it is impossible to say precisely, but appearances indicate that it will be a lava eruption—presenting, indeed, a most brilliant spectacle, but unaccompanied by those horrors which marked the eruptions of 1854, 1861, and 1872; but, as Prof. Palmieri observes, it is impossible to say how it will terminate. A *Daily News* correspondent sends an interesting account of a visit he has paid to the crater of Vesuvius, into which he descended, and tells what he saw:—The actual crater is placed almost in an amphitheatre, three-fourths of which are inclosed, while one-fourth is open. The inclosing walls rise above the bed of the crater from 250 or more feet in some parts, apparently composed of sulphur. The diameter, judging by the eye, from one side to the other, is about 300 yards, and the whole of this area is filled with lava on fire, but crusted on the surface with a skin some inches deep of lava that has been chilled. "Looking between the cracks or down the 'crevasses,' the glowing fires a few inches below our feet, and in the blocks whereon we were standing, were seen. The ten months' activity has enabled the volcano to raise a cone almost in the centre of the crater at least a hundred feet in height, very wide at the base, converging to the summit like a sugar-loaf, but with the summit of the loaf removed. With a pulsation as regular and as marked as that of the piston of a steam-engine in full motion, did the huge mountain carry on its work, so that now we were able clearly to understand what was meant by 'every pulsation of the volcano being duly registered at the observatory.' Clouds of smoke and fumes were issuing from the summit of the cone—now densely dark, as if a fresh supply of coal had been heaped on the fire; then intensely light, as if the engine were blowing off its steam; then most beautifully and delicately tinted with the tenderest rose-pink, as if an artist were testing how best to combine the loveliest tints of his art; then a pale salmon, a little while, and then as if five thousand torpedoes were simultaneously exploded. The huge mountain seemed to heave, and forth from its mouth issued immense quantities of molten lava, shot scores of feet high up into the air—apparently at the mouth all in one body, but there separating into millions of pieces, great and small, all glowing with the most intense red heat that can possibly be seen. Each piece as it ascended into the air was separate; no piece was partly red and partly black, but was on fire and at red-heat throughout; mostly the lava emitted fell back again into the bosom of the heaving mass, but with every emission quantities, large or small, fell on the outside of the mouth, and thus we saw readily how the cone had gradually but continuously increased in size and height. Every now and then a huge mass would drop outside, and then would be heard an immense crash, followed by vast quantities of lava rolling down the sides of the cone. As we stood watching, at intervals there seemed to be the firing of 10,000 guns of mightier calibre than Krupp's, and we soon found that this was the precursor of a grand display. Up rose, possibly 100 feet above the cone, an immense mass spreading in the shape of a lady's fan, and presenting one of the most magnificent sights the eye of man can ever see. And this upheaval was not a thing for which we had to wait till our patience was exhausted, and to wonder if it would be repeated or not, but was continuous and incessant, and almost seemed as if every renewed expulsion were grander than its precursor, or as indicating a trial of actual strength prior to the great event proposed to be completed."

THE foundation-stone of the proposed railway bridge across the Firth of Forth was laid last week.

LAST March a microscopical society was formed in Highbury under the presidency of Dr. Alabone. The numbers have steadily increased, and the society appears to have all the elements for a career of great prosperity. The opening *soirée* for the winter session will be held at Harecourt Hall, St. Paul's Road, commencing at 7.30 p.m. to-night.

MANY valuable papers were read at the meeting of the Sanitary Institute at Stafford last week, and if Government and the public are ignorant of the laws of public health and the best methods of carrying these into practice, it is from no want of enlightenment. The great want at present seems to be organisation and an efficient central authority, and we trust the practical and vigorous address of Sir Henry Cole on Sanitary Co-operation will meet with attention in the proper quarters, and lead to more systematic and efficient action than has hitherto existed. In an able paper Dr. Richardson advocated the appointment of a Minister of Health.

MESSRS. HARDWICKE AND BOGUE announce the following works for publication:—"A Manual of the Infusoria, comprising a Descriptive Account of all known Flagellate, Ciliate, and Pentaculiferous Protozoa," by W. Saville Kent, F.L.S.; "The Herefordshire Pomona," containing Coloured Figures and Descriptions of the most esteemed kinds of Apples and Pears, edited by Robert Hogg, LL.D., F.L.S., Part I., illustrated with coloured figures and woodcuts; "Clavis Synoptica Hymenomycetum Europæorum, conjunctis studiis scripserunt M. C. Cooke, A.L.S., et L. Quelet, M.D., O.A., Inst. et Sorb. laur.;

"The Sphagnaceæ, or Peat Mosses of Europe and North America," by R. Braithwaite, M.D., F.L.S., &c., illustrated with 29 plates; "Pollen," by M. P. Edgeworth, F.L.S. F.R.S., second edition, revised and corrected, illustrated with 438 figures; "The Ferns of North America," by Prof. D. C. Eaton, of Yale College, illustrated with numerous coloured plates by James H. Emerton, to be completed in 20 parts, published at intervals of about two months; "Flowers, their Origin, Shapes, Perfumes, and Colours," by J. E. Taylor, F.L.S., F.G.S., second edition; "Health Primers," edited by J. Langdon Down, M.D., F.R.C.P., Henry Power, M.B., F.R.C.S.; J. Mortimer-Granville, M.D., F.G.S., F.S.S.; and John Tweedy, F.R.C.S. Under this title will be issued a series of shilling primers on subjects connected with the preservation of health, written and edited by eminent medical authorities. The following volumes will be issued in October:—"Premature Death, its Promotion and Prevention;" "Alcohol, its Use and Abuse;" "Personal Appearances in Health and Disease (illustrated);" "Exercise and Training" (illustrated); "The House and its Surroundings;" "The Skin and its Troubles" (illustrated); "Baths and Bathing." Others will follow at short intervals.

THE national *fête* for the distribution of the Paris Exhibition awards will take place, as stated, on October 22. The whole of the Versailles Park will be lighted by electricity.

IN connection with the meeting of the Library Association last week at Oxford, we would recommend to our readers' attention a most interesting and really amusing little *brochure* by Mr. H. B. Wheatley, entitled "What is an Index? A few Notes on Indexes and Indexers." Mr. Wheatley gives many amusing instances of how not to do it, and his pamphlet will be found useful not only to indexers, but to all who in any way have to do with the arrangement of written or printed matter. It is published by Sotheran and Co. The Library Association has already assumed vigorous proportions, and in spite of its much talk seems likely to do real service to existing libraries and to the promotion of new ones.

THE great work of connecting the triangulation of Algeria with the geodetic net-work of Europe, through Spain, is progressing favourably. The Spanish staff officers under General Ibanez have established their post on Sierra Nevada and Mount Tetica, and the French near Nemours, and Ben Sabra, near Oran. M. Perrier, member of the Bureau des Longitudes, and director of the French Survey, will very shortly proceed to Algiers to take the last readings from the French side.

OF all the accidents to which submerged submarine cables are liable, one would suppose that that by fire would be the very last that would occur. Nevertheless, such an accident has happened to the Forth cable belonging to the Post Office. Lately all four wires were found earthy. The fault showed itself by test to be close to the shore. It was found below high-water mark at the foot of the cliff. Some boys during low water had been making a fire with the shavings and rubbish found on the beach, immediately over the cable, melting the compound and gutta percha of the core, and leaving the copper wires bare and in contact with the outside sheathing.

THE municipality of Prague, advised by the Hygienic Council of that city, have just issued an edict prohibiting ladies from wearing dresses with long trains in the public streets, on account of the dust which the appendices raise being detrimental to public health. The municipality of Leipzig published a similar edict some time ago. These measures are easily explained by the habit assumed by many representatives of the fair sex of letting their trains drag through dust (and worse) for the sake of producing an effect which we presume milliners consider important from the point of view of sexual selection.

THE Meteorological Central Office of Vienna reports upon an aurora borealis of immense extent on September 25. It appears that the phenomenon was visible for several nights in the whole of Scandinavia and Northern Russia. It covered the larger portion of the northern sky, and appeared in a yellowish red light, with frequent undulations of bright and intensely yellow rays.

WE are glad to see that Prof. Geikie has added to the usefulness of his "Elementary Lessons in Physical Geography" by preparing a series of questions. These have recently been issued by Macmillan and Co.

THE Paris *Temps* publishes daily the charts of the Central Bureau of French Meteorology. The experiment was tried by the *Opinion Nationale* two years ago, but was discontinued.

PROF. LEBOUR has prepared a convenient and complete catalogue of the Hutton collection of fossil plants, which are specially valuable as illustrating the carboniferous flora of some of the horizon in the Newcastle coal-field. The system followed is, with few exceptions, that of Schimper. The catalogue has been drawn up by order of the Council of the North of England Institute of Mining and Mechanical Engineers.

THE *Cologne Gazette* announces that on Saturday night two slight shocks of earthquakes were remarked at Buir and in the surrounding district. The first occurred about 10 o'clock, and the second about an hour later. There was a slight shock of earthquake at Parma during the night of the 2nd inst.

THE Annual Exhibition of the Photographic Society was opened yesterday.

THERE will be a meeting of anthropologists combined with an anthropological exhibition at Moscow during the summer of 1879.

THE appearance of phylloxera in some vineyards near Bonn, on the Rhine, has been officially announced.

"TABLES for Use in the Verification of Standards of Weight and Measure," by Dr. O. J. Broch, Standards Commission, Christiania, is the title of a valuable paper recently translated under the directions of the Standards Department, Board of Trade. It embraces tables of specific gravity, coefficients of expansion, elastic force of aqueous vapour, and the weight of water.

MR. L. S. BENSON, New York, of π notoriety, has submitted to English mathematicians his *demonstration* (this time in ink) of a *discrepancy* between the analytical and geometrical proofs of a property of the parabola, viz., that the area of any segment is exactly two-thirds of the rectangle on abscissa and ordinate.

THE Dutch Government, encouraged by the excellent results obtained, in a commercial point of view, through the construction of the Y-Muiden Canal, which connects Amsterdam directly with the German Ocean, has now the intention to construct a similar canal to connect Amsterdam with Gorinchem, and to render the Waal and the Rhine navigable for sea-going vessels, so that even larger vessels could in future sail as far as Arnheim, and s'Hertogenbosch. Of course Rotterdam, Dortrecht, Moordijk, and Flushing would also benefit by the completion of the intended new works.

THE New York *Daily Graphic* furnishes some particulars of interest respecting the Nez Percés, a tribe of Indians, the greater portion of which was captured by the United States' troops about a year ago and confined in an encampment near Fort Leavenworth, on the Missouri. Their chief, it appears, carries in his hand a looking-glass which "is used to direct military manœuvres in battle by means of reflected rays of light. Their various significations, however, have never yet been found out by the white man . . . The orders are apparently

conveyed to distant parts of the field by a system somewhat similar to the dashes and dots of the Morse telegraphic code." The Nez Percés are described as a particularly fine race and well behaved. Their women are very industrious, and when not engaged in carrying wood and water, &c., "are generally hard at work in the manufacture of beaded mocassins, gauntlets, and Indian doll babies . . . The little boys, too, reap quite a harvest by displaying their skill with the bow and arrow." One of the most curious institutions of the tribe is a primitive description of Turkish bath. "The Missouri River runs close by their encampment, and on the bank of the river they have built what has the appearance of a gigantic ant-hill; in shape it is similar to a small Esquimaux hut, about six feet in diameter and two or three feet high. There is an aperture on one side just large enough for a man to get through, and in the interior there is just sufficient room for him to lie in a cramped position. They first build a fire outside in which they heat limestones until almost red-hot. They then shovel them into the hut and pour water on them so as to produce a dense vapour, after which they quickly rake the stones on, crawl in through the entrance hole which they cover up with a blanket, and lie there until the perspiration streams from every pore, when they come outside and plunge into the Missouri River and swim to the nearest sand-bank."

THE additions to the Zoological Society's Gardens during the past week include a Mona Monkey (*Cercopithecus mona*) from West Africa, presented by the Rev. W. N. Ripley; a Macaque Monkey (*Macacus cynomolgus*) from India, presented by the Rev. E. L. Marrett; a Cape Zorilla (*Ictonyx zorilla*) from West Africa, presented by Mr. Calman; a Laughing Kingfisher (*Dacelo gigantea*) from Australia, presented by Mr. Delves L. Broughton; a Red-beaked Weaver-bird (*Quelea sanguinirostris*) from West Africa, presented by Mr. W. H. Simmonds; a Passerine Owl (*Glaucidium passerinum*), European, presented by Miss Turner; a Sumatran Rhinoceros (*Rhinoceros sumatrensis*) from Malacca, an Anubis Baboon (*Cynocephalus anubis*), a Macaque Monkey (*Macacus cynomolgus*), a Bonnet Monkey (*Macacus radiatus*) from India, a Kinkajou (*Cercoleptes caudivolvulus*) from South America, deposited; a Chinchilla (*Chinchilla lanigera*), born in the Gardens.

CYON'S RESEARCHES ON THE EAR

I.

THIS able and elaborate thesis, presented by Dr. de Cyon to the Medical Faculty of Paris, contains a further contribution of facts and speculations in reference to the function of the semicircular canals of the internal ear, a subject upon which, as Professor of Physiology in St. Petersburg, he had previously published an important and interesting paper.

As a knowledge of the form and position of these organs is absolutely necessary to enable the reader to follow a discussion of the theories as to their use, we shall preface this notice of Dr. de Cyon's thesis with a short anatomical statement.

The system of semicircular canals, which exists in the internal ear of all vertebrates, while differing greatly in size in different animals, is so nearly the same in general arrangement, that a description of it as found in man will be sufficient for our present purpose.

These organs are lodged in a bony cavity continuous with the cochlea which contains the organ of hearing. The vestibule is an irregular rounded chamber. In its walls are five openings leading to the semicircular canals. These are tunnels in the bone having an elliptical or circular section, and opening at each end into the vestibule. The central line or axis of each canal lies nearly in one plane (which we may call the plane of the canal), and is approximately an arc of a circle. At one end of each canal there is an enlargement called the ampulla. The diagram (Fig. 1) represents a section through the axis of one of the canals.

The planes of the three canals are very nearly at right angles to one another. The canals are named from their position—the horizontal, the superior, and the posterior; the two latter unite at their non-ampullary ends before joining the vestibule, so that

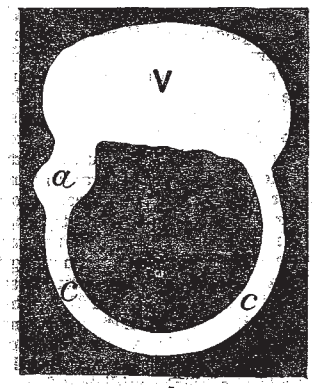

Fig. 1.

Section of bony labyrinth showing vestibule and one of the semi-circular canals. V, vestibule; *c c*, canal; *a*, ampulla.

there are five, and not six, openings into the vestibule—three ampullary, one for each canal, and two non-ampullary, one for the horizontal and one common to the superior and posterior canals.

The plane of the horizontal canal is nearly horizontal in the ordinary position of the head in all animals,[1] and is always at right angles to the mesial plane; the planes of the other two canals make nearly equal angles with the mesial plane. These relations are indicated diagrammatically in the accompanying sketch (Fig. 2), from which, to prevent confusion, the vestibule has been omitted.

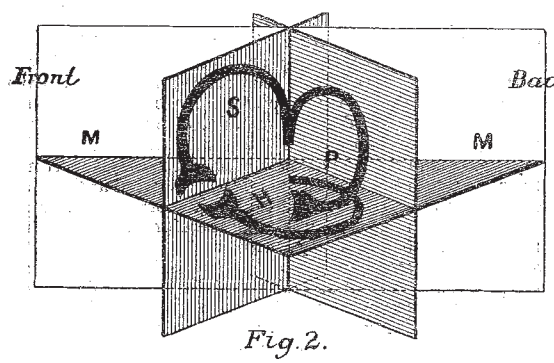

Fig. 2.

Diagram showing the relations of the planes of the three semi-circular canals of the left ear to each other and to the mesial plane. M M, mesial plane; S, P, H, the planes of the superior, posterior, and horizontal canals respectively.

In the bony labyrinth just described is inclosed a membranous labyrinth, similar in form, and consisting of the utricle, lodged in the vestibule, and of three membranous semicircular canals, each furnished with a membranous ampulla. The membranous labyrinth does not fit tight into its bony case—the utricle is much smaller than the vestibule (which contains, besides, other organs connected with the cochlea), and the diameter of the membranous canals is not more than one-fifth of that of the osseous canals. In the ampullæ the difference is not nearly so great; here there is only a narrow space between the bone and the membrane. The entire cavity is thus divided into two spaces, one within and one around the membranous labyrinth; each is filled with a liquid named the endolymph and the perilymph respectively. The external space contains, in addition to the perilymph, connective tissue attaching more or less firmly the membranous canals to the periosteum, and the blood-vessels and nerves which supply the membranous labyrinth. The nerves are distributed to a spot called the *macula acustica*, in the utricle,

[1] Recherches expérimentales sur les Fonctions des Canaux semi-circulaires et sur leur Rôle dans la Formation de la Notion de l'Espace. Par Elie de Cyon, M.D., &c., Lauréat de l'Institut de France.

[1] In man the plane of the horizontal canal slopes somewhat downwards and backwards, so that it becomes horizontal when the head is slightly bent forwards.